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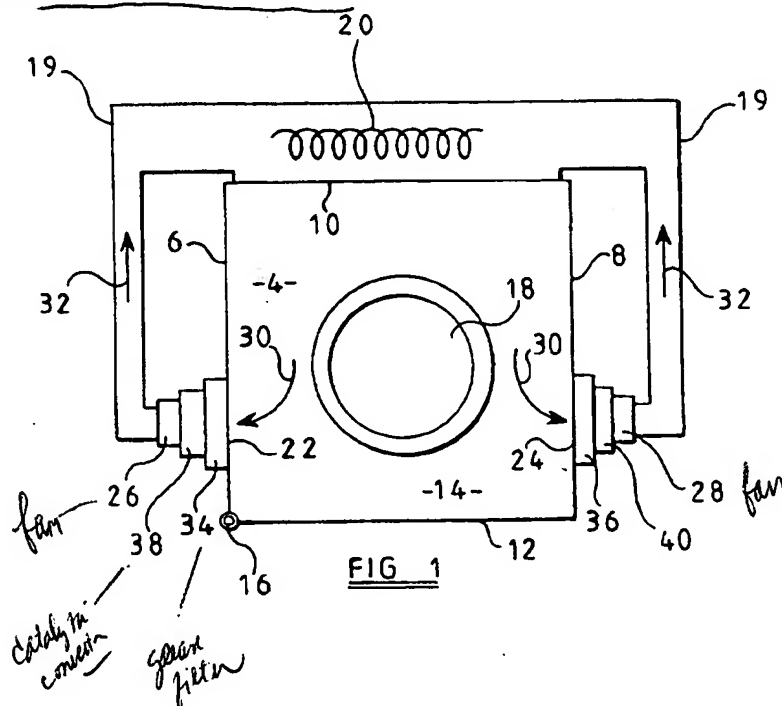
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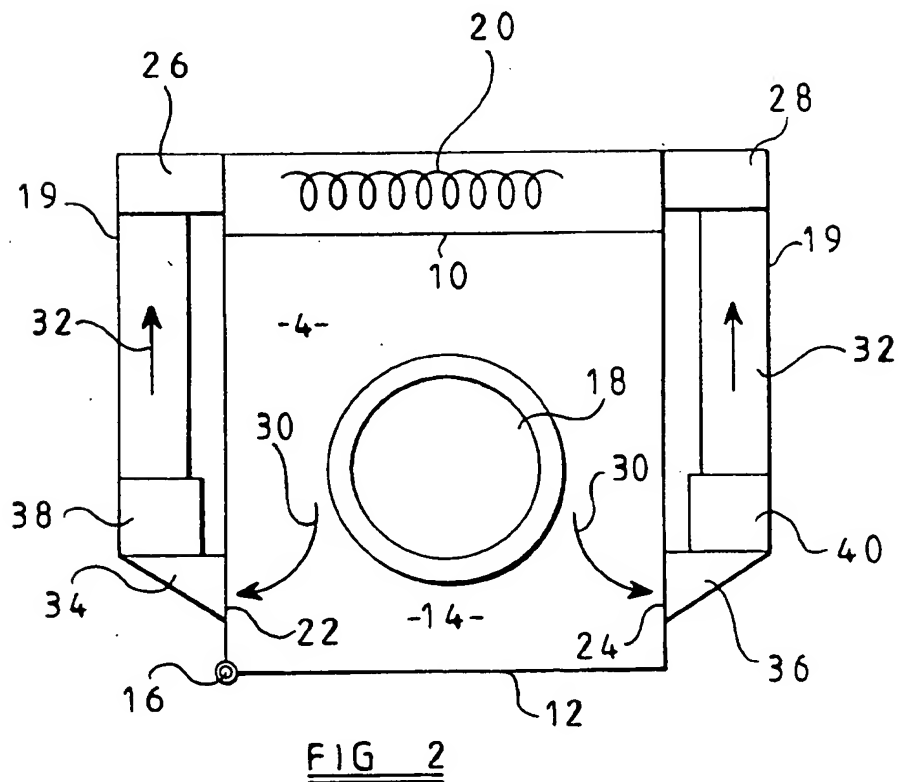
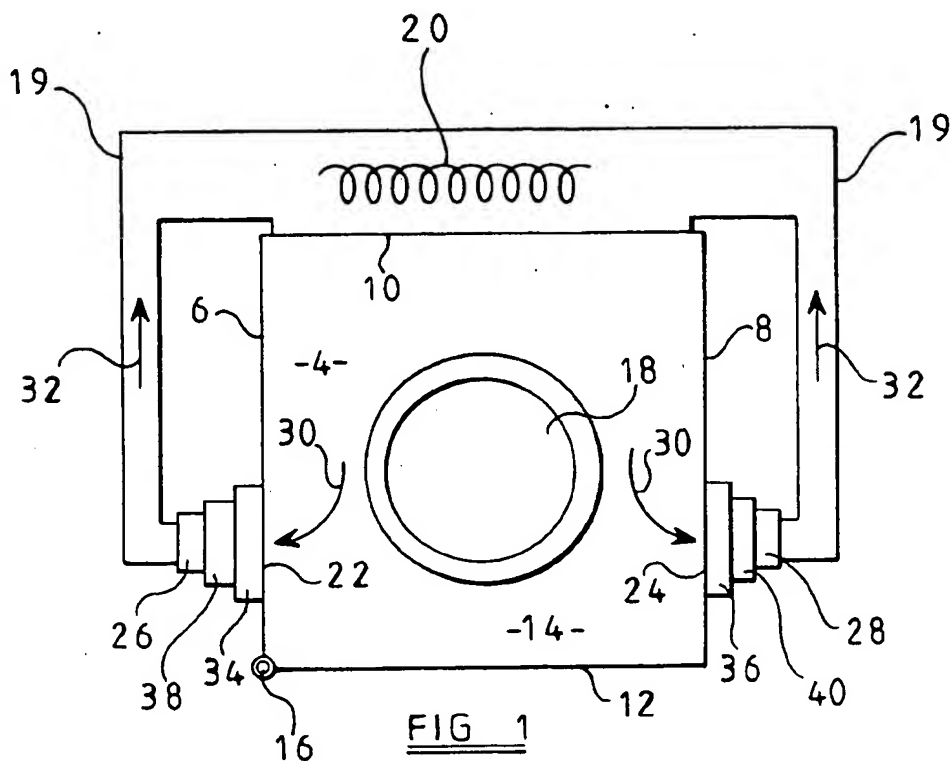
(56) Documents Cited  
GB 2337104 A

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(54) Abstract Title  
**Ovens with catalytic converters**

(57) An oven comprises a number of chamber walls 6, 8, 10, 12, 14 defining a cooking chamber 4, heating means 20 for heating food within the cooking chamber 4, at least two openings 22, 24 in the chamber walls, fan means 26, 28 for driving air out of the cooking chamber 4 through said openings 22, 24, wherein each opening 22, 24 is provided with a grease filter 34, 36 located downstream of the opening 22, 24, and a catalytic converter 38, 40 located downstream of said grease filter 34, 36. Each catalytic converter 38, 40 may be located within 5, 10 or 20 centimetres of its respective opening, and lie immediately adjacent its respective grease filter. The oven may be a microwave combination oven.





### Ovens with Catalytic Converters

The invention relates to ovens with catalytic converters for removing airborne grease particles. The invention relates to any type of oven, but is particularly applicable to  
5 microwave combination ovens.

It is known to use catalytic converters in ovens in order to flamelessly oxidise oxidisable components in the hot air from the cooking chamber. For example, a recycling oven using such a catalytic converter is described in International Patent  
10 Application Number PCT/US98/10736. In this oven hot air from the cooking chamber is passed through a catalytic converter before being returned to the cooking chamber.

One disadvantage of the arrangement described in international application number PCT/US98/10736 is that daily cleaning is required for the ducting which directs hot air  
15 from the cooking chamber to the catalytic converter. A further disadvantage is that the air-flow within the cooking chamber is somewhat uneven.

The present invention seeks to overcome at least some of the disadvantages of the prior art.

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According to the invention there is provided an oven comprising a number of chamber walls defining a cooking chamber, heating means for heating food within the cooking chamber, at least two openings in the chamber walls, and fan means for driving air out of the cooking chamber through said openings,

25 wherein each opening is provided with a grease filter located downstream of the opening, and a catalytic converter located downstream of the grease filter.

It will be appreciated that, because there are two openings in the chamber walls the air-flow within the cooking chamber is more even than would be the case if only a single  
30 opening was provided.

Further, optional features of the invention are set out in the accompanying dependent claims.

The invention will now be more particularly described, by way of example only, with reference to the accompanying figures, which show two embodiments of microwave combination ovens constructed in accordance with the invention.

Figure 1 shows a microwave combination oven provided with two air outlets; and

Figure 2 shows a second embodiment in which the fans are located at the rear of the oven.

Figure 1 shows a cross-sectional view of a microwave combination oven 2 viewed in schematic form from above. The oven 2 comprises a cooking chamber 4 defined by two side walls 6 and 8, a rear wall 10, a front door 12, a base 14, and an upper wall (not shown) connected to the side walls 6 and 8 and the rear wall 10 above the base 14. The front door 12 is hinged to the side wall 6 by hinges 16, and can be opened to gain access to the cooking chamber 4.

A rotating turntable 18 is mounted on the base 14 in known manner. Food within the cooking chamber 4 can be cooked by microwave energy provided by a microwave source (not shown) or by an electric heating element 20, or by a combination of both in known manner. It is for this reason that such ovens are referred to as "combination" ovens.

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In order to allow infrared radiation from the heating element 20 to fall directly on the food to be cooked, the rear wall 10 is provided with a plurality of perforations (not shown) and the heating element 20 is located directly behind the rear wall 10.

Furthermore, the inside surfaces of the walls of the cooking chamber 4 are formed from reflective stainless steel, which ensures that infrared radiation from the heating element 20 bounces around within the cooking chamber 4 in order to reach the food on the

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turntable 18 from substantially all directions. It will be appreciated that such infrared radiation is useful in browning the surface of the food to be cooked, if this is required.

The side walls 6 and 8 are provided with respective side openings 22 and 24. Two fans 26 and 28 are provided for circulating air from within the cooking chamber 4. The air is drawn out of the cooking chamber 4 through the two openings 22 and 24, and re-enters the cooking chamber through the perforations formed in the rear wall 10. Ducting 19 is provided to direct the air from the fans 26 and 28 to the rear wall 10. The flow path of the air is illustrated by arrows 30 within the cooking chamber 4, and by arrows 32 outside of the cooking chamber 4.

The side openings 22 and 24 are provided with grease filters 34 and 36 attached to the side walls 6 and 8 respectively. These filters filter out large splatters of grease from food being cooked within the cooking chamber 4. The grease filters 34 and 36 can be of any suitable type, including paper or electrostatic grease filters. The fact that the grease filters 34 and 36 are attached to the side walls 6 and 8 avoids the need to clean any ducting between the side walls 6 and 8 and the grease filters 34 and 36, as is necessary in the prior art mentioned above.

Catalytic converters 38 and 40 are attached directly to the grease filters 34 and 36 in order to flamelessly oxidise oxidisable components in the hot air which has passed through the grease filters 34 and 36. This process also releases additional heat, which assists the cooking process. The catalytic converters 38 and 40 are formed from a metallic monolith containing the elements Iron, Chromium and Aluminium, onto which is deposited a catalytic coating containing Platinum together with one or more elements in the Lanthanide Series.

It will be appreciated that because the catalytic converters 38 and 40 are attached directly to the grease filters 34 and 36 there is no ducting leading to the catalytic converters 38 and 40 from the cooking chamber 4, and the labour involved in cleaning such ducting is therefore avoided. There may of course be some ducting between the grease filters 34 and 36 and the catalytic converters 38 and 40, but this should be kept to

a minimum, and is ideally less than 20cm. In this embodiment of the invention, the catalytic converters 38 and 40 are spaced approximately 2.5cm from the openings 22 and 24.

- 5 The fans 26 and 28 are connected directly behind the catalytic converters 38 and 40.

The cooking chamber 4 has a height of 31.5cm, a depth of 33cm, and a width of 33cm. The side openings 22 and 24 are substantially circular, of diameter about 13cm, and are formed by perforating the side walls 6 and 8 by circular holes of diameter 4.2mm. A  
10 number of areas of similar perforations are also used in the rear wall 10. These perforations allow the flow of air, while ensuring reflection of microwave radiation.

In the second embodiment shown in Figure 2 like parts are given like reference numbers. The fans 26 and 28 are located towards the rear of the oven. The openings 22  
15 and 24 are provided with triangular shaped grease filters 34a and 36a attached to the side walls 6 and 8 respectively. The catalytic converters 38 and 40 are attached directly to the grease filters 34a and 36a. This arrangement allows a more compact oven to be produced whilst ensuring that the ducting 19 remains free from any grease contamination.

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It will also be appreciated that because there are two openings in the side walls of the cooking chamber 4, each provided with a separate fan, the air-flow within the cooking chamber 4 is more even, and the food within the cooking chamber 4 cooks more evenly, than would be the case if only a single opening was provided.

**CLAIMS:**

1. An oven comprising a number of chamber walls defining a cooking chamber, heating means for heating food within the cooking chamber, at least two openings in the chamber walls, and fan means for driving air out of the cooking chamber through said openings,  
5 wherein each opening is provided with a grease filter located downstream of the opening, and a catalytic converter located downstream of the grease filter.
- 10 2. An oven as claimed in claim 1, wherein each opening is provided with a separate fan.
3. An oven as claimed in claim 1 or 2, wherein the openings are provided in opposite side walls of the oven.
- 15 4. An oven as claimed in any preceding claim, wherein each grease filter is attached substantially directly to one of the chamber walls.
5. An oven as claimed in any preceding claim, wherein each catalytic converter is  
20 located within 20 centimetres of its respective opening.
6. An oven as claimed in any preceding claim, wherein each catalytic converter is located within 10 centimetres of its respective opening.
- 25 7. An oven as claimed in any preceding claim, wherein each catalytic converter is located within 5 centimetres of its respective opening.
8. An oven as claimed in any preceding claim, wherein each catalytic converter is located substantially immediately adjacent its respective grease filter.
- 30 9. An oven as claimed in claim 8, wherein there are no other components between each catalytic converter and its respective opening except one of the grease filters.

10. An oven as claimed in any preceding claim, wherein said air which is driven out of the cooking chamber is recirculated back into the cooking chamber after passing through the catalytic converters.
- 5 11. An oven as claimed in any preceding claim which is a microwave combination oven.
12. An oven as claimed in any preceding claim, wherein an electric heating element
- 10 is provided to heat air in the cooking chamber.
13. An oven as claimed in claim 12, wherein the heating element is arranged to emit infrared radiation directly onto food within the cooking chamber.
- 15 14. An oven as claimed in claim 13, wherein the electric heating element is provided directly behind one of the chamber walls which is provided with perforations which allow the chamber wall both to transmit infrared radiation from the electric heating element and to reflect microwave radiation back into the cooking chamber.
- 20 15. An oven as claimed in any preceding claim, which further comprises a rotatably driven turntable for rotating food to be cooked within the cooking chamber.





Application No: GB 0016987.0  
Claims searched: All

Examiner: Simon Berry  
Date of search: 15 August 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.R): F4W

Int CI (Ed.7): F24C 15/20, 15/32

Other: ONLINE DATABASES: EPODOC, WPI, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2337104 A (TURBOCHEF TECHNOLOGIES INC.) Example of an oven chamber with a single opening and filtering mechanism.	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.